Sediment Transport in the Snake and Clearwater Rivers

Objectives:

- **Develop transport curves for suspended sediment, bed sediment, and different particle sizes in the Snake and Clearwater Rivers.**
- **Quantify the sediment load entering Lower Granite Reservoir from the Snake and Clearwater Rivers.**
- **Evaluate changes in the sediment transport characteristics over a 30 year time period based on data collected by the USGS during 1972-79 and published as OFR 80-690.**

SEDIMENT TRANSPORT IN THE SNAKE AND CLEARWATER RIVERS IN THE VICINITY OF LEWISTON, IDAHO

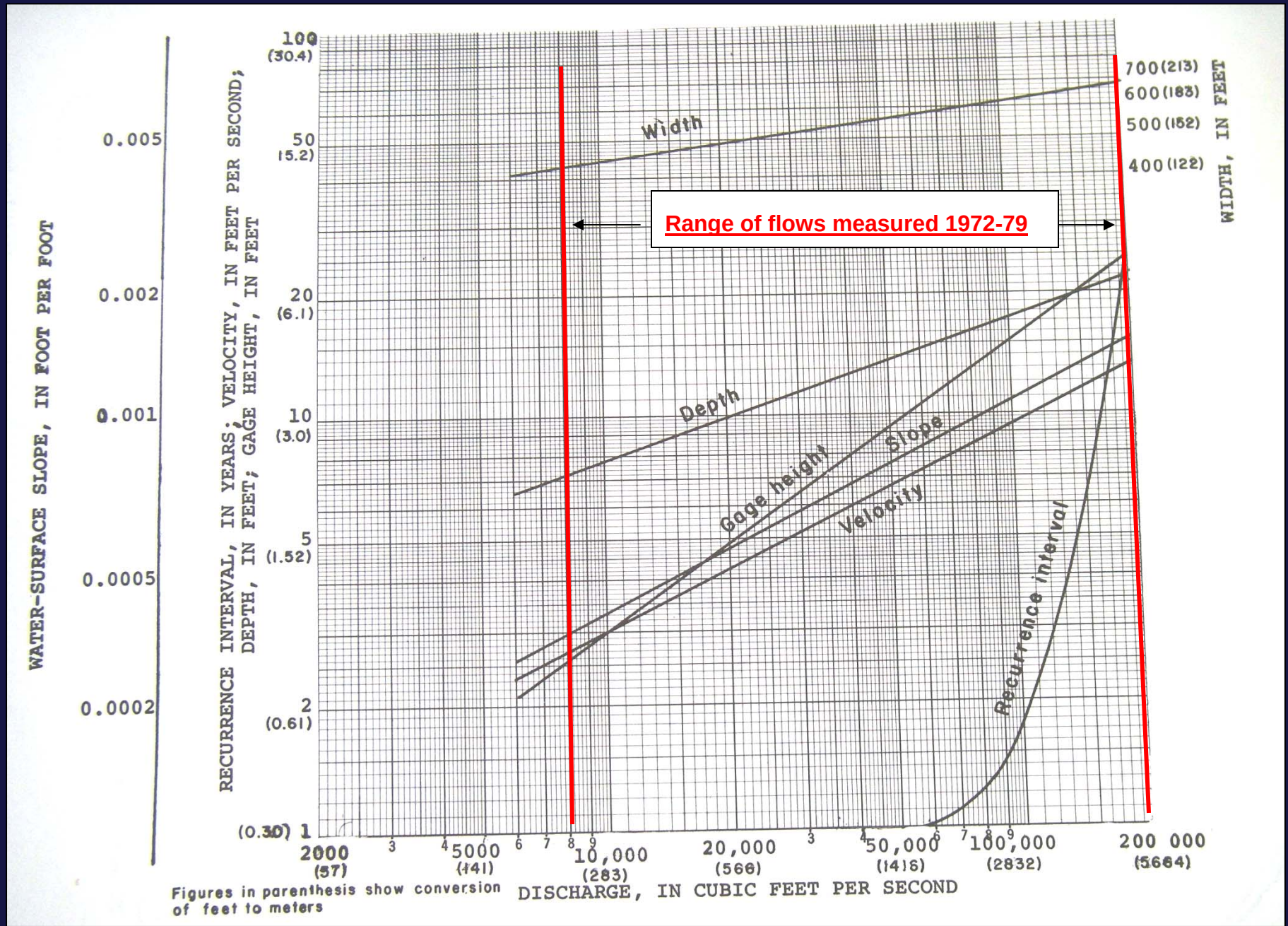
U. S. GEOLOGICAL SURVEY

Water-Resources Investigations

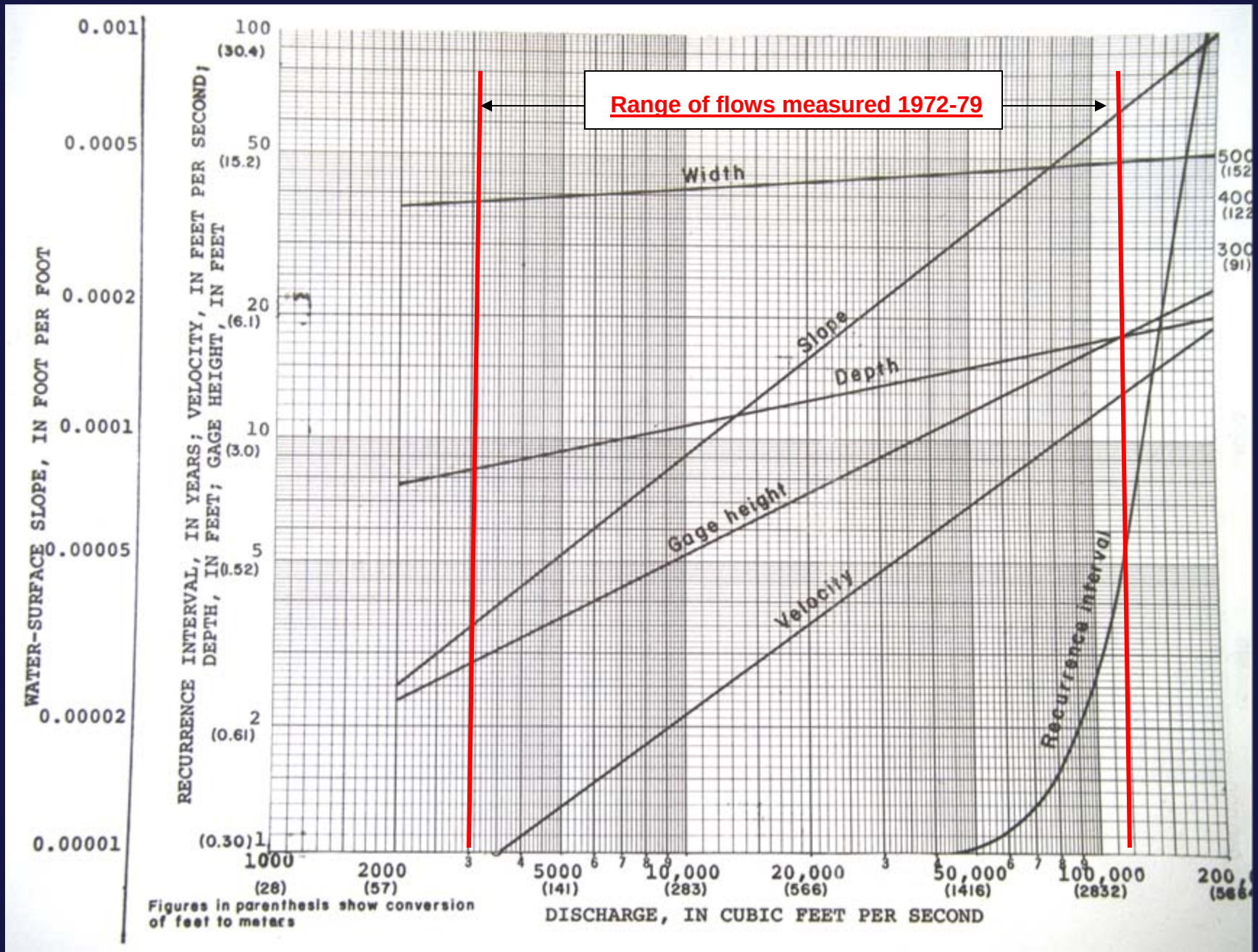
Open-File Report 80-690

Prepared in cooperation with the U.S. Army Corps of Engineers, Walla Walla District

Hydraulic characteristics in the Snake River near Anatone, WA



Hydraulic characteristics in the Clearwater River at Spalding, ID



Sediment Transport Characteristics, 1972-79

Snake River as measured at Anatone

Suspended Sediment load ranged from 50,000 tons per year (1977) to 5 million tons per year (1974).

Bed Sediment load ranged from "to low to measure" (1977) to 200,000 tons per year (1972, 1974).

Clearwater River as measured at Spalding

Suspended Sediment load ranged from 50,000 tons per year (1973, 1977) to 1 million tons per year (1972, 1974).

Bed Sediment load ranged from 1,000 tons per year (1973, 1977) to 50,000 tons per year (1972, 1974).

Sediment Transport Characteristics, 1972-79

Combined Snake and Clearwater

Bedload ranged from about 2-10 percent of suspended load averaging about 5 percent.

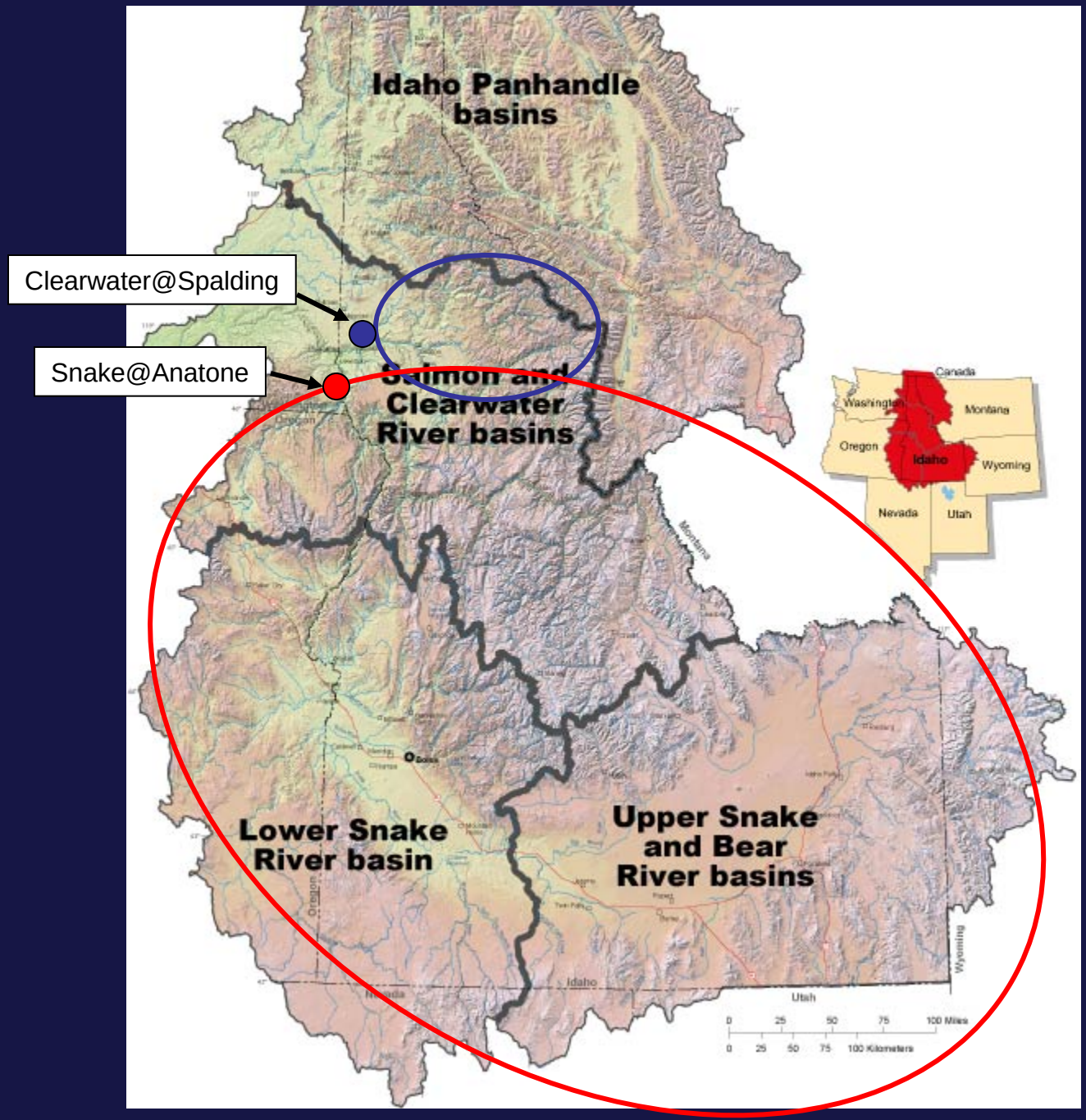
Bedload particle size was bimodal – either medium to coarse sand or very coarse gravel.

Suspended particle size was generally finer than sand.

Total Sediment load to Lower Granite Reservoir

1979 – 670,000 tons, or assuming a unit weight 100 lb/ft^3, 500,000 cubic yards.

1974 – 6.8 million tons or 5 million cubic yards


Idaho Panhandle basins
Clearwater@Spalding
Snake@Anatone
Salmon and Clearwater River basins
Lower Snake River basin
Upper Snake and Bear River basins
Canada
Washington
Montana
Oregon
Idaho
Wyoming
Nevada
Utah
Montana
Oregon
Idaho
Wyoming
Utah
0 25 50 75 100 Miles
0 25 50 75 100 Kilometers

Basin Characteristics

Snake River @ Anatone

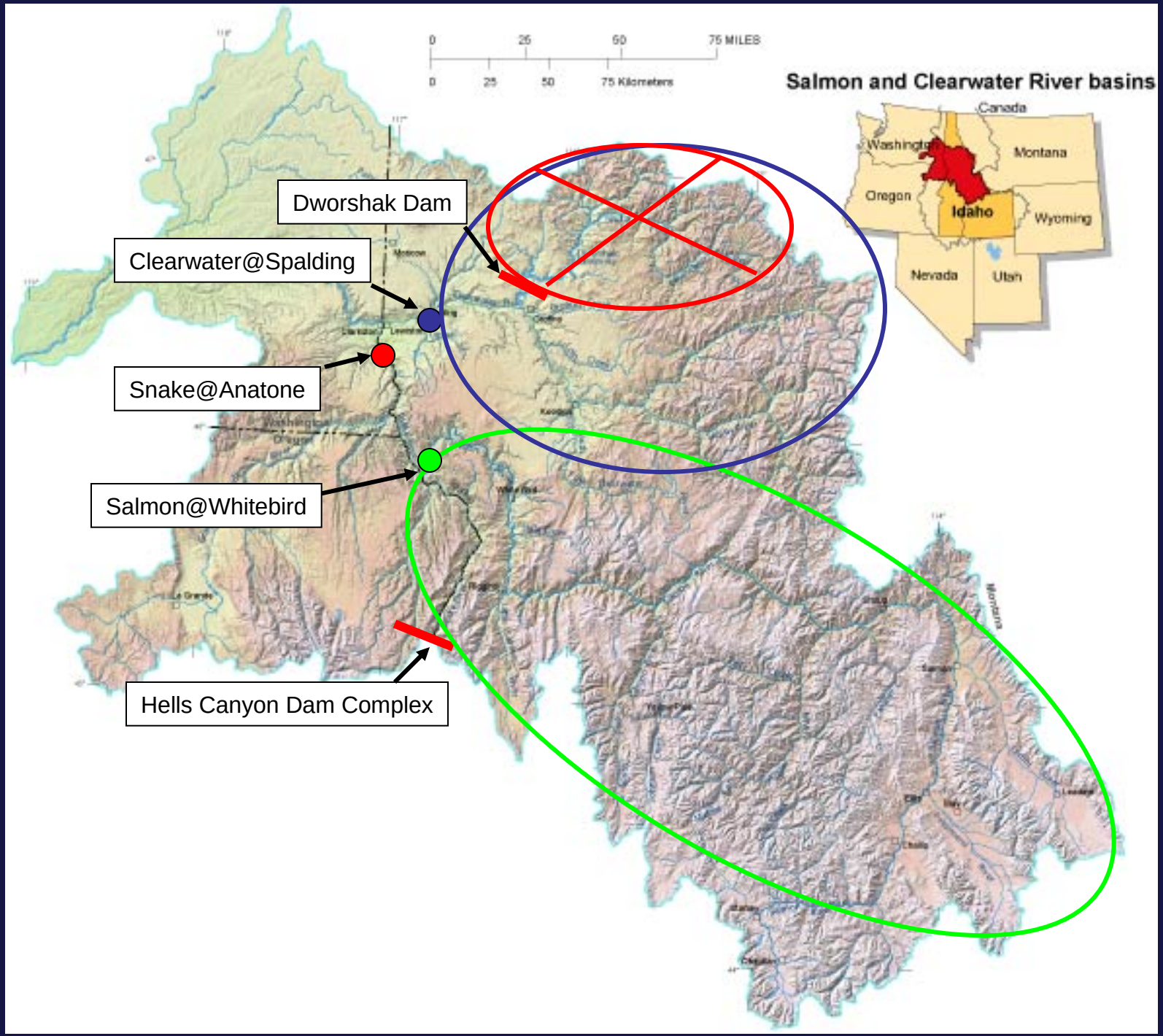
Basin Size - ~93,000 mi^2

Annual Mean Discharge - 35,300 cfs

Clearwater River @ Spalding

Basin Size - ~9,600 mi^2

Annual Mean Discharge - 15,400 cfs


Salmon and Clearwater River basins
0 25 50 75 MILES
0 25 50 75 Kilometers
Canada
Washington
Montana
Oregon
Idaho
Wyoming
Nevada
Utah
Dworshak Dam
Clearwater@Spalding
Snake@Anatone
Salmon@Whitebird
Hells Canyon Dam Complex

Effective Basin Characteristics

Snake River @ Anatone

Basin Size - ~ 93,000 mi^2

Area contributing sediment - ~ 19,700 mi^2

Annual Mean Q - 35,300 cfs

Annual mean Q contributing sediment – 15,100 cfs

Clearwater River @ Spalding

Basin Size - ~ 9,600 mi^2

Area contributing sediment - ~ 7,160 mi2

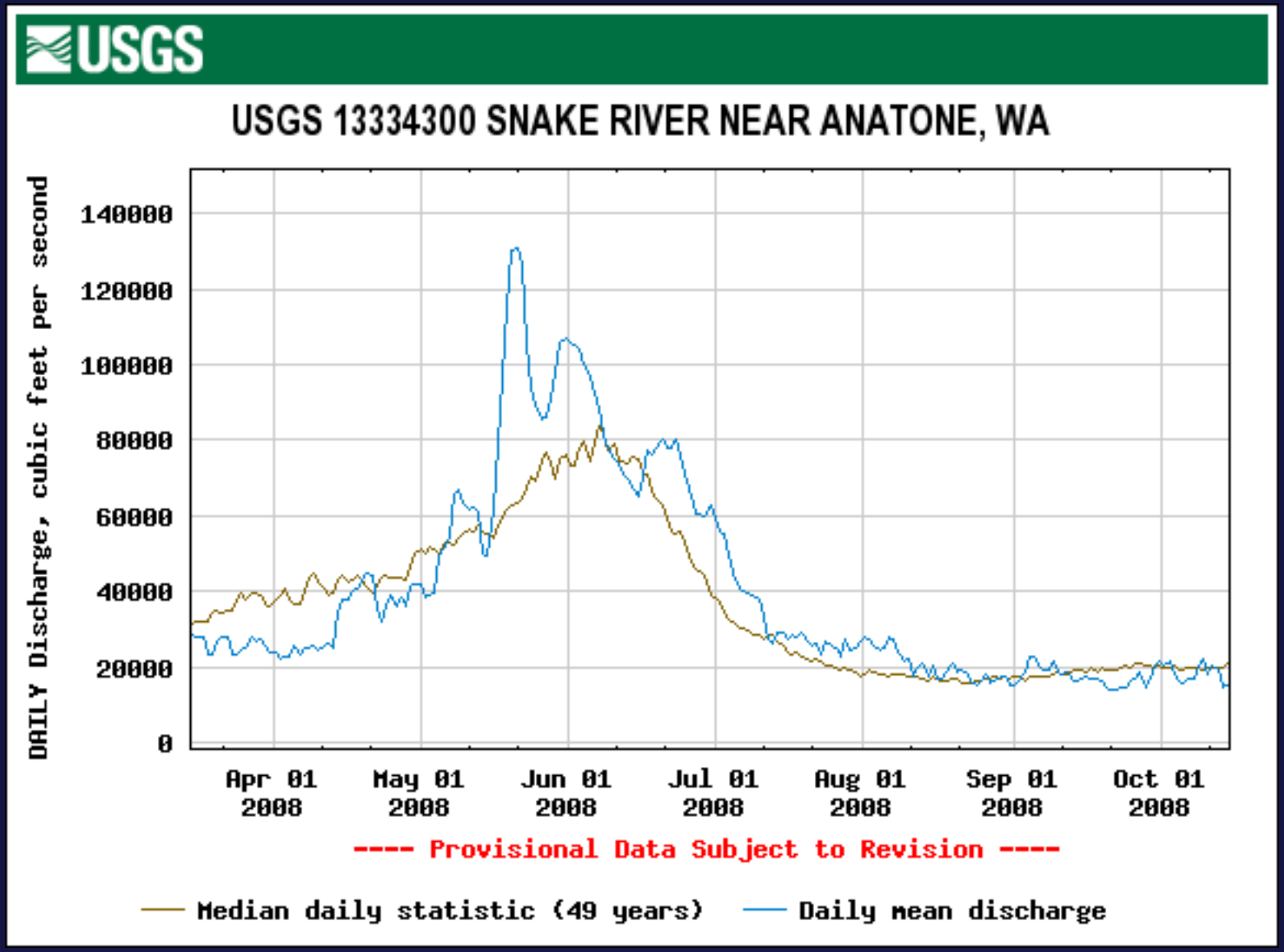
Annual Mean Q - 15,400 cfs

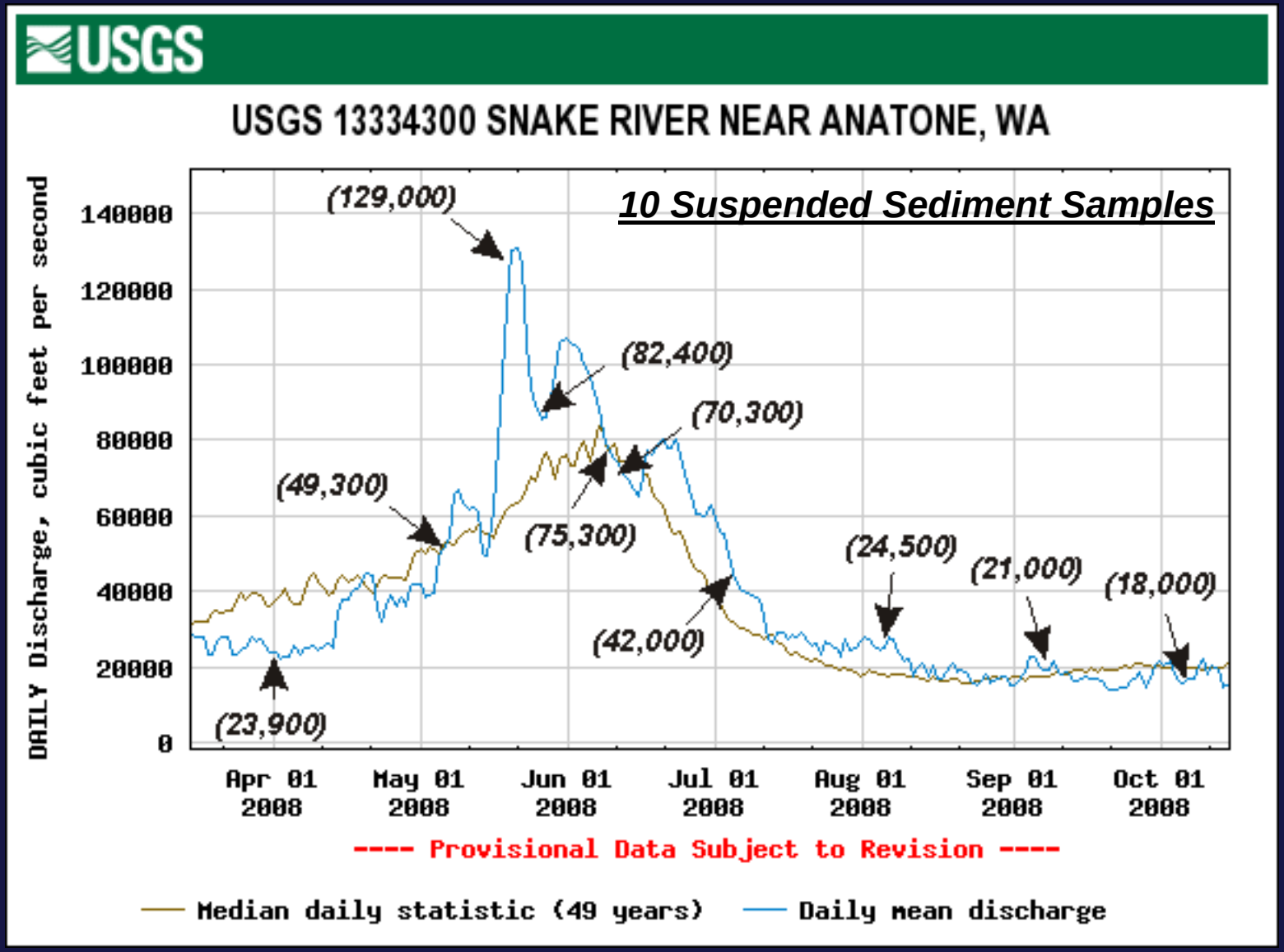
Annual mean Q contributing sediment – 10,000 cfs

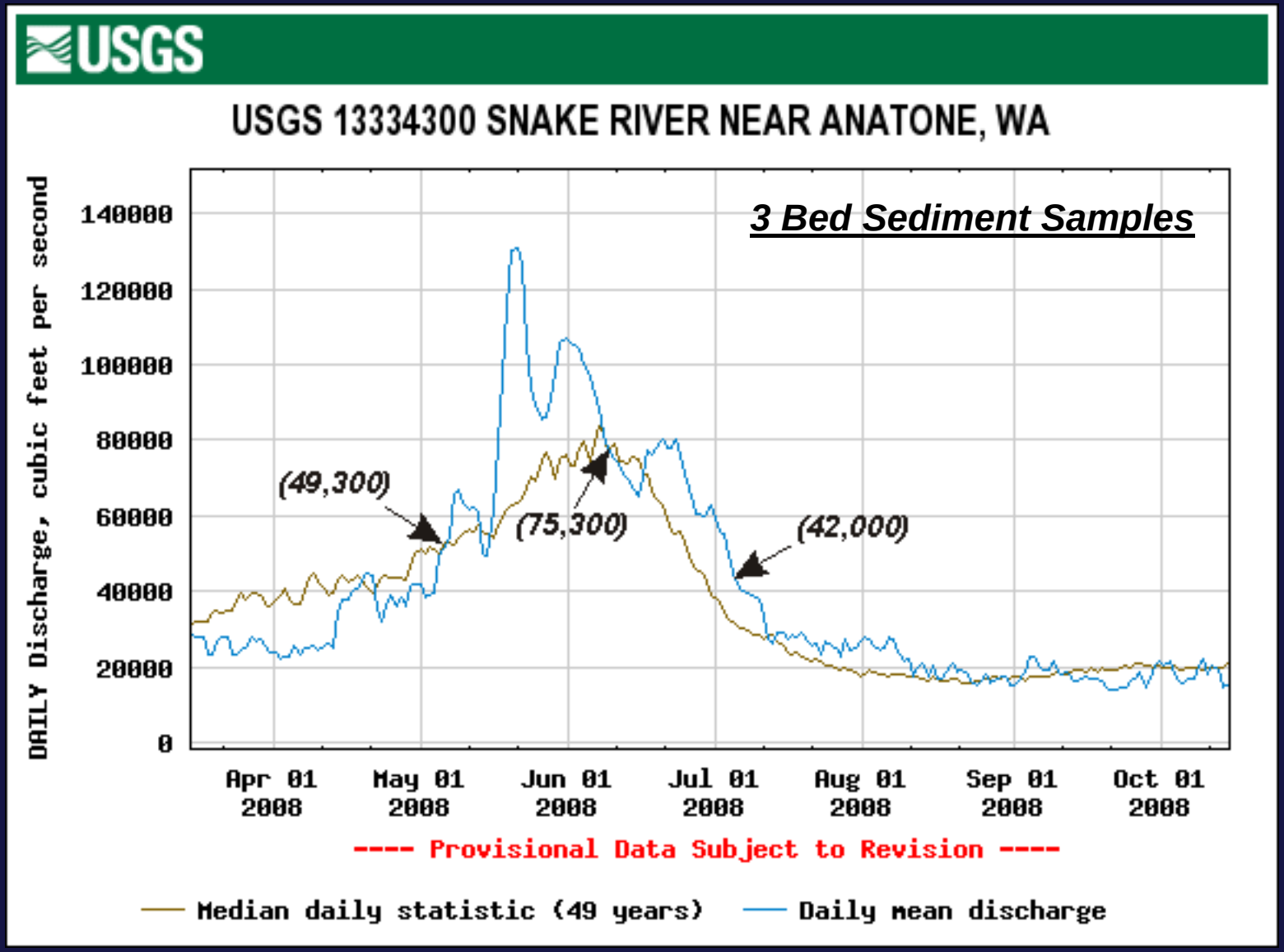

United Rentals
CASE

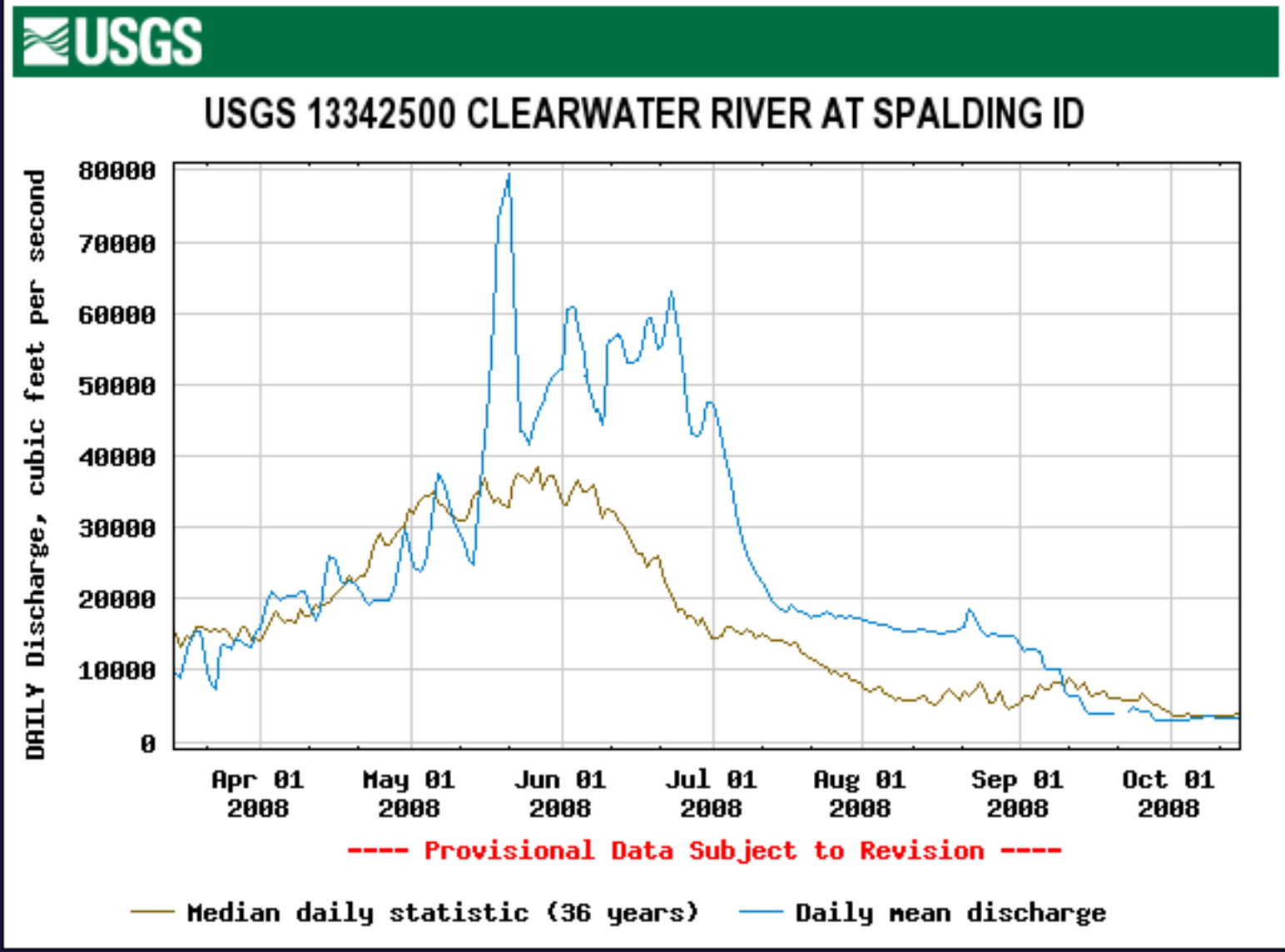

KEEP
OFF

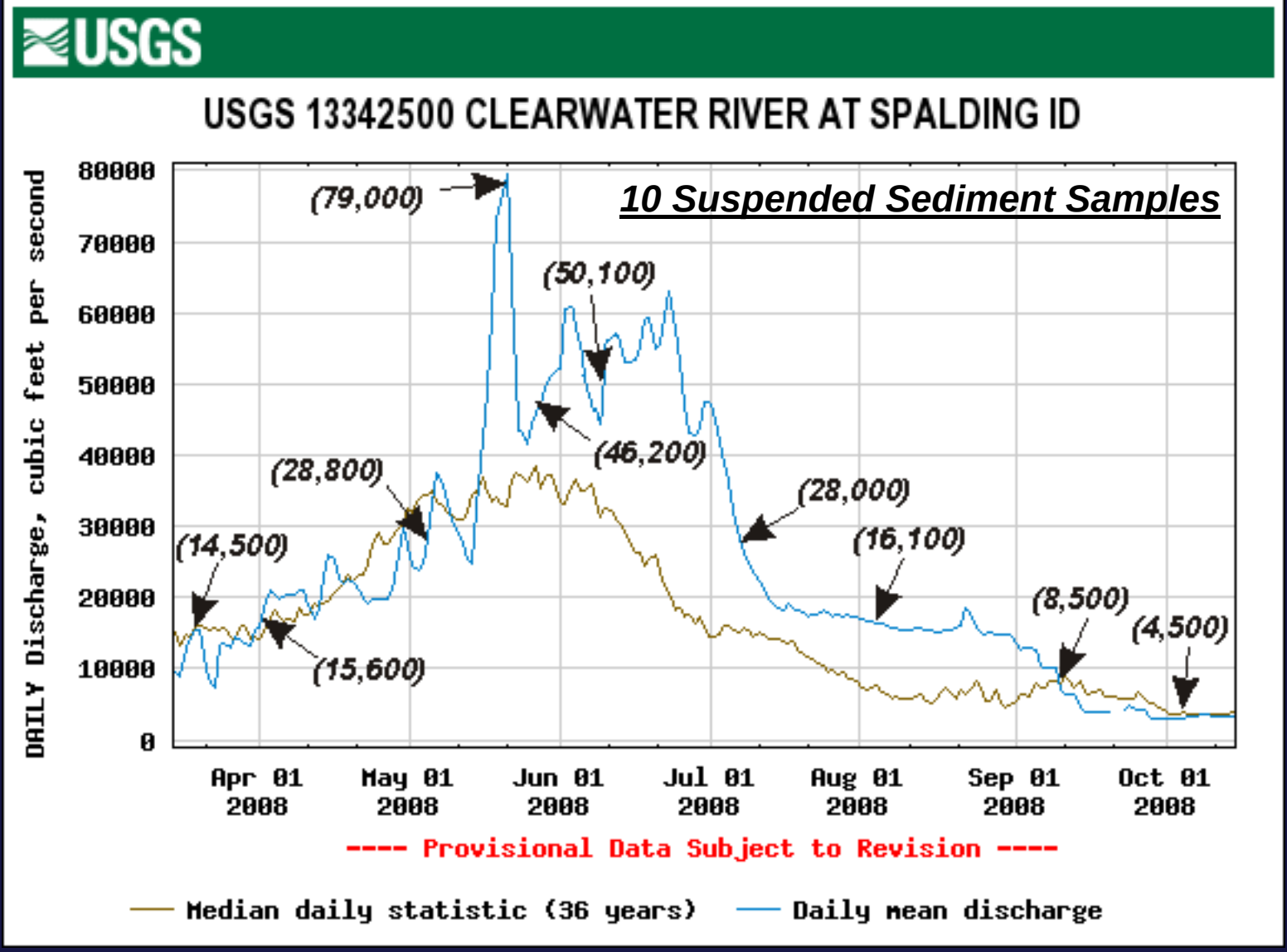

Mt. Clarke 3/3
Snake R. @
Anatone, WA
3/6/2008
134
Scotch® Brand
Scotch® Bra
Scotch®

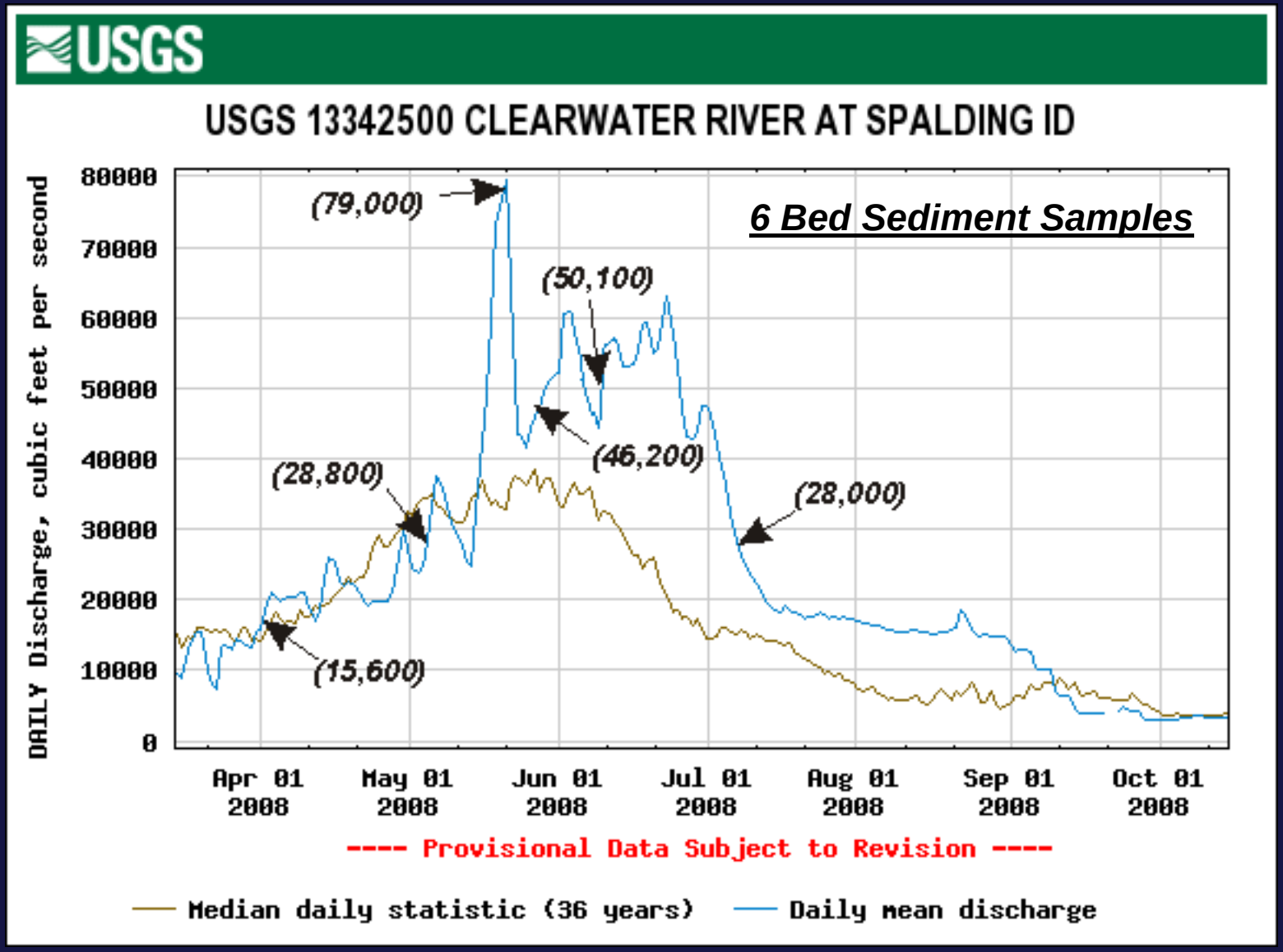

USGS
USGS 13334300 SNAKE RIVER NEAR ANATONE, WA
DAILY Discharge, cubic feet per second
140000
120000
100000
80000
60000
40000
20000
0
Apr 01 2008
May 01 2008
Jun 01 2008
Jul 01 2008
Aug 01 2008
Sep 01 2008
Oct 01 2008
---- Provisional Data Subject to Revision ----
Median daily statistic (49 years)
Daily mean discharge


USGS
USGS 13334300 SNAKE RIVER NEAR ANATONE, WA
10 Suspended Sediment Samples
DAILY Discharge, cubic feet per second
140000
120000
100000
80000
60000
40000
20000
0
(129,000)
(82,400)
(70,300)
(49,300)
(75,300)
(24,500)
(21,000)
(18,000)
(42,000)
(23,900)
Apr 01 2008
May 01 2008
Jun 01 2008
Jul 01 2008
Aug 01 2008
Sep 01 2008
Oct 01 2008
---- Provisional Data Subject to Revision ----
Median daily statistic (49 years)
Daily mean discharge


USGS
USGS 13334300 SNAKE RIVER NEAR ANATONE, WA
3 Bed Sediment Samples
DAILY Discharge, cubic feet per second
140000
120000
100000
80000
60000
40000
20000
0
(49,300)
(75,300)
(42,000)
Apr 01 2008
May 01 2008
Jun 01 2008
Jul 01 2008
Aug 01 2008
Sep 01 2008
Oct 01 2008
---- Provisional Data Subject to Revision ----
Median daily statistic (49 years)
Daily mean discharge


USGS
USGS 13342500 CLEARWATER RIVER AT SPALDING ID
DAILY Discharge, cubic feet per second
80000
70000
60000
50000
40000
30000
20000
10000
0
Apr 01 2008
May 01 2008
Jun 01 2008
Jul 01 2008
Aug 01 2008
Sep 01 2008
Oct 01 2008
---- Provisional Data Subject to Revision ----
Median daily statistic (36 years)
Daily mean discharge


USGS
USGS 13342500 CLEARWATER RIVER AT SPALDING ID
10 Suspended Sediment Samples
DAILY Discharge, cubic feet per second
80000
70000
60000
50000
40000
30000
20000
10000
0
(79,000)
(50,100)
(46,200)
(28,800)
(14,500)
(15,600)
(28,000)
(16,100)
(8,500)
(4,500)
Apr 01 2008
May 01 2008
Jun 01 2008
Jul 01 2008
Aug 01 2008
Sep 01 2008
Oct 01 2008
---- Provisional Data Subject to Revision ----
Median daily statistic (36 years)
Daily mean discharge


USGS
USGS 13342500 CLEARWATER RIVER AT SPALDING ID
6 Bed Sediment Samples
DAILY Discharge, cubic feet per second
80000
70000
60000
50000
40000
30000
20000
10000
0
(79,000)
(50,100)
(46,200)
(28,800)
(28,000)
(15,600)
Apr 01 2008
May 01 2008
Jun 01 2008
Jul 01 2008
Aug 01 2008
Sep 01 2008
Oct 01 2008
---- Provisional Data Subject to Revision ----
Median daily statistic (36 years)
Daily mean discharge